

Family practice nurse views on barriers to immunising children

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Abstract

New Zealand (NZ) has low immunisation coverage for infants and children compared to many other westernised countries. Barriers to improving uptake are multifactorial, with health professional knowledge and attitudes identified as important modifiable factors. In NZ practice nurses give most childhood vaccinations in the primary health care setting. This study explored aspects of 150 family practice nurse views, knowledge and experience about immunisation. Qualitative and quantitative text data were obtained through randomised computer assisted telephone surveys and converged using a triangulated multi-method approach. Response rate was 89.3% nurses identified parents' fear as the greatest barrier to achieving better immunisation uptake and disagreed that health professional knowledge was a barrier. However, findings showed lack of knowledge among many participants, despite many feeling confident about their knowledge base. Factors associated with lower practice coverage of infants under 2 years were poorer knowledge of contraindications to vaccination and lack of completion of vaccinator training, especially an update course. A high level of confidence, more years in practice, dedicated time to follow-ups were not associated with better coverage rates. Practice nurses may be unaware that their knowledge in some areas needs improving. A trained practice nurse appears to play a significant role in overcoming fears and maintaining high coverage rates in their practice. We conclude that strategies that focus on primary health care provider support and education are more likely to gain high coverage than those that are purely directed at overcoming access barriers.

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1. Introduction

Childhood immunisation coverage in New Zealand (NZ) is lower than in many other westernised countries and in its Pacific neighbours. UNICEF 1998 data indicated that NZ was ranked 102nd out of the 193 listed countries for its primary infant series immunisation rates [1]. In response to the current low rates, NZ has introduced a number of initiatives. These include the development of a register to track children's immunisation status, and increasing availability of outreach services.

The NZ situation contrasts with developments in Australia and the United States, both of which have recorded improved immunisation rates in recent years. These changes have been achieved by the use of a combination of approaches [2,3]. In both countries an increased emphasis on supporting providers and communicating vaccine safety issues has been a major component of their improved coverage strategy.

The knowledge of nurses, physicians and other health providers about immunisation and their ability to clearly communicate risk-benefit information to parents has been identified as one of the most important factors in vaccine uptake [4–7]. There is an active anti-immunisation lobby in NZ [8] and while there has been national and local efforts to provide accurate immunisation messages to the public, it is evident that the activities of the lobby group contribute to the erosion of public confidence [9]. Recent research indicates that

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many NZ parents have low confidence in immunisation, and vaccine safety is a primary concern [10]. Access to health care services also is consistently highlighted as a major issue, particularly for parents from the lower socio-economic groups. However, evidence indicates that parental fear and active decisions not to vaccinate is in itself sufficiently high to prevent achieving the 95% target uptake rate [11]. The ability of some local primary health care initiatives to overcome the poor national coverage rates and consistently obtain coverage rates for their populations over 90% demonstrates that well integrated primary health care services with committed health professionals can make considerable difference, even without addressing the access issues with outreach services [12].

The immunisation programme for NZ infants is delivered within the primary health care setting. NZ research supports the interpersonal relationship with the health professional as being the one in which the parents have confidence and trust [13]. In contrast the other education avenues such as Ministry of Health brochures or information from pharmaceutical companies can be held in considerable suspicion [13].

In NZ family practice, family physicians (general practitioners) and practice nurses work as a team. In most practices the doctor's primary role is to educate parents about immunisation issues, and to opportunistically encourage them to have their children vaccinated when they present for other health reasons. Only in a small minority of practices do doctors actively administer vaccines. The practice nurse's role generally involves not only parental education, but all aspects of immunisation delivery including ordering, safely storing (with documented evidence of maintenance of the cold chain) and administering vaccines to children, as well as maintaining a recall system for all children registered with the practice. In group practices with two or more doctors and nurses, there is usually at least one practice nurse who is likely to have attended one of the nationally standardised vaccinator training courses, which include two-yearly updates. A small number of sole family physician practices do not employ practice nurses (7% of all practices) [14] and in these cases the doctor assumes all responsibility for immunisation administration.

The aim of this study was to understand the immunisation issues confronting practice nurses in NZ using a national randomised computer-assisted telephone survey. The questions focused on general practice organisation issues; nurse perceptions of barriers to improving immunisation; their knowledge and educational needs regarding immunisation; preferred resources, and their own practices around immunisation. This study was conducted contemporaneously with a similar survey of NZ family physicians [14].

2. Methods

Both quantitative and qualitative text data were obtained through computer-assisted telephone surveys. These

data were converged using a triangulation, multimethod approach to understand immunisation issues confronting practice nurses.

2.1. Sample population

The study was conducted between July 2002 and January 2003. The subjects were practice nurses working in family practices throughout NZ. A list of 1283 national family practices was obtained from a commercial vendor, the most comprehensive and reliably updated database available to NZ researchers. The interviewer was supplied with a list of computer generated randomly selected practices and continued contacting practices in the order provided until 150 nurses had been recruited to the study. The inclusion criterion was any immunising practice nurse working at the practice either part or full-time. All practices carrying out childhood immunisations were considered eligible. In practices with more than one practice nurse, the interviewer spoke to the nurse primarily responsible for administering vaccines, with a request to participate in the survey. Exclusion criteria were non-vaccinating practices included in the commercial vendor's list (family planning clinics; some accident and medical centres; sports medicine practices); agency (locum) nurses or practices without a practice nurse.

The sample size of 150 is justified by sample size calculation using EpiInfo 2000. For a population of approximately 3211 NZ practice nurses (1600 full time) with an expected frequency of 53% of health professionals who would know that egg allergy is not a contraindication to MMR vaccination (based on international literature [4]) $\pm 8\%$, and to get 95% confidence level, a sample of 143 people is needed. The precision of the estimate was assessed by using standard error and 95% confidence interval, which is acceptably small ($\pm 8\%$ with a potential of further reduction for situations where expected frequency is lower than 47%).

Approval for the study was obtained from the University of Auckland Human Ethics Committee.

2.2. Questionnaire design

The design of the questionnaire was based on areas identified in the literature as barriers to immunisation. It also explored nurses' educational needs and preferred sources for immunisation information, their confidence and their knowledge [10,15].

2.3. Data collection

A computer-assisted telephone survey tool that managed the sample and questions facilitated interviewing. The interview lasted about 20 min with answers entered directly into the database for collation and analysis. Quantitative responses included yes/no answers, Likert scales, multi-choice options and demographic data including age, gender and nature, duration in, and location of, practice.

Qualitative data involved free-form answers to questions including other perceived barriers to immunisation, sources of information about immunisation and identification of adverse reactions requiring notification to the national passive reporting system—the Centre for Adverse Reactions Monitoring (CARM).

2.4. Data analysis

Quantitative data analysis was conducted using EpiInfo 2000 where differences between groups were sought. Cross tabulations were carried out to determine differences between age groups; years in practice; urban versus rural and responses to some of the key areas.

Free-form data response analysis used a general inductive approach. Individual text responses were initially analysed to identify sub-themes. The data was then collated and analysed for emerging categories. These were combined into major themes through ongoing discussions and re-reading of the data by the first two authors until consensus was reached regarding the main themes being expressed. Where applicable, codes previously used for family physician responses to the same questions were utilised. The data were independently double-coded as a consistency check with discrepancies resolved by adjudication. Themes were determined and combined through discussions between two of the researchers (H P-H and F G-S) until consensus was reached.

3. Results

3.1. Response rate

A total of 199 randomly selected practices were contacted to reach a sample of 150 nurse participants. Thirty-one practices did not meet the inclusion criteria. The active participation rate of eligible nurses was 89.3% (150/168). Of the 18 nurses who did not complete the survey, five declined and 12 requested the researcher to call back but a suitable time for interview was unable to be scheduled within the study period.

All but two of the practice nurses were female (98.7%) and the majority (78%) were aged 40 years or older. However, 84 (56%) had been in practice less than 10 years, indicating a relatively late onset to this vocation. Fifty percent

worked part-time (less than eight-tenths) and 87 (58%) had pre-school or school-aged children.

3.2. Barriers to immunisation

Table 1 presents the nurses' responses to a list of possible barriers to child immunisation perceived by practice nurses, with parental fear (68.7%) emerging as the major factor. Access to services was not seen as a substantial barrier by either urban or rural nurses. When their responses to the open-ended question on barriers to immunisation were analysed, the strongest theme to emerge was parents' lack of information, or misinformation regarding immunisation, especially that received from their attending midwives. Many also identified cultural and language factors, both with indigenous Māori and also with Pacific Island and Asian immigrant populations. Parental apathy ('*They never get around to it.*') was an identified barrier. There was strong support for a national immunisation register to follow-up transient families.

3.3. Practice nurse knowledge

To test their knowledge, participating practice nurses were asked about their considerations on contraindications to the measles/mumps/rubella (MMR) and pertussis vaccinations (Table 2). The nurses were categorised into those who had completed vaccinator training within 2 years and those who had trained more than 2 years ago or not at all. Whether the course was a base course or an update course was noted. Their mean number of correct answers to questions regarding contraindications for MMR and pertussis vaccines indicated that those who had received training over 2 years prior to the survey, or had never attended a course, were significantly less likely to give correct responses (Bartlett's $\chi^2 = 7.1077$, 1 d.f., $p = 0.0077$). When the type of course attended was analysed those that had attended an update course rather than a base course scored significantly better ($\chi^2 = 4.79$, $p = 0.029$).

When the nurses were categorised according to the vaccine coverage rates within their child patient population, those with the highest coverage rate ($\geq 95\%$) had a significantly higher mean number of correct answers than those with the lowest coverage rate ($< 70\%$) (Bartlett's test $p = 0.0034$).

Nearly a quarter of participants believed that fully breast-fed babies either always or sometimes receive specific protection against pertussis 35 (23.3%) and 10 (7%) believed fully

Table 1
Practice nurses' perceived barriers to improving immunisation ($N = 150$)

Barrier	Agree, n (%)	Neither agree nor disagree, n (%)	Disagree, N (%)
Parental fear regarding immunisation	103 (68.7)	17 (11.3)	30 (20.0)
Lack of funding for providers	31 (20.6)	11 (7.3)	108 (72.0)
Lack of time for providers to offer services	24 (16.0)	10 (6.7)	116 (77.3)
Patient difficulties accessing services	22 (14.7)	11 (7.3)	138 (92.0)
Lack of knowledge in health professionals	7 (4.7)	5 (3.3)	117 (78.0)
Lack of interest in the topic by providers	4 (2.7)	6 (4.0)	140 (93.3)
Poor Ministry of Health direction	4 (2.7)	6 (4.0)	140 (93.3)

Table 2
Practice nurse perceived contraindications to MMR and pertussis vaccinations ($N=150$)

	Correct answer	
	<i>n</i>	Rate (%)
Perceived contraindication to MMR vaccination		
Baby being treated for leukaemia*	50	33.3
Baby gets a rash eating eggs	65	43.3
Baby has spina bifida and hydrocephalus	84	56.0
Mother pregnant	114	76.0
Baby had a febrile convulsion at 11 months	119	79.3
Baby with snuffly cold	122	81.3
Baby reported to have had measles	123	82.0
Sibling has ADHD, Autism or Aspersers	128	85.3
History of parental febrile fits	129	86.0
Mother breastfeeding	140	93.3
Baby has eczema	142	94.7
Perceived contraindication to pertussis vaccination		
Baby had an HHE following previous immunisation	25	16.7
Screaming for more than 3 h after the previous immunisation	39	26.0
Baby had apnoea in first 3 weeks	92	61.3
Baby has spina bifida, no leg weakness	103	68.7
Baby has motor delay*	109	72.7
Baby has a nasal discharge	116	77.3
Other sibling had fever following DTaP	146	97.3
History of parental febrile fits	141	94.0
Baby has eczema	141	94.0
Sibling has eczema or asthma	148	98.7

Actual contraindications to immunisation. Key—ADHD: attention deficit hyperactivity disorder; HHE: hypotonic hyporesponsive episode; DTaP: diphtheria, tetanus and acellular pertussis vaccine.

breastfed infants received specific protection against measles. There appeared to be some level of concern about the age at which infants are first immunised with 12 (8%) considering the scheduled 6 weeks as too young and 20 (13.3%) considering that this was sometimes so. The preferred ages were 8 weeks ($n=9$), 10 weeks ($n=8$), 12 weeks ($n=13$) and other ($n=2$).

Further analysis of practice nurses who scored less than 14/21 (67%) correct responses to the knowledge questions was conducted. This score was selected because 70% is the pass mark for vaccinator training courses in NZ. There were 50 participants (33% of the total sample) in this group. Of these 50, 30 (60%) said that they did not need more knowledge on vaccine side effects. Furthermore, 14 (28%) said that they were very comfortable, 26 (52%) were comfortable and 10 (20%) were neither comfortable nor uncomfortable about their knowledge of immunisation, with none slightly uncomfortable or not comfortable about their knowledge of immunisation.

3.4. Practice nurse confidence

To explore whether confidence influenced vaccine coverage, all participants were categorised into two groups according to their level of confidence regarding their knowledge of immunisation. One hundred and twenty-seven nurses were very comfortable or comfortable about their knowledge on immunisation and 23 nurses were neither comfortable nor uncomfortable about their immunisation knowledge. Nurses

with immunisation coverage $<90\%$ and $\geq 90\%$ were compared. No statistical significance was found between the two groups ($\chi^2=0.06$, $p=0.813$).

3.5. Information resources

All respondents cited the Ministry of Health Immunisation Handbook as a source of further information on immunisation and 93% used their local immunisation coordinator/district immunisation facilitator. Over all, practice nurses use a range of sources to get further information including other Ministry leaflets and booklets, colleagues and the university-based National Immunisation Advisory Centre services.

3.6. Practice nurse educational needs

When presented with list of various educational needs (Table 3), those identified by the nurses as most important were information on current issues reported in the media, for example anthrax and bio-terrorism, or the relationship between MMR and autism ($n=99$; 66%) and information on new vaccines ($n=73$; 48.7%).

From the qualitative analysis of their responses to other immunisation related information they would like, the major (most frequently raised) theme to emerge was the need for resources to counter misinformation on immunisation and to clearly present relative benefits and risks ('*Accurate information to hand to parents disproving the myths.*'). A number also expressed the need for easy access to immunisation sched-

Table 3
Educational needs identified by nurses

Area of knowledge	Yes, <i>n</i>	Yes, %
Current issues reported in the media	99	66.0
New vaccines	73	48.7
Support with methods for obtaining informed consent, and answering parental concerns	59	39.3
Knowledge of the vaccines	44	29.3
Knowledge around vaccine side-effects	41	27.3
Knowledge around the NZ immunisation schedule, and rationale behind it	32	21.3
Knowledge of the diseases	27	18.0
Knowledge around delivery techniques	24	16.0

ules from other countries, to better facilitate immunisation updates for immigrant families.

The health professionals we have surveyed tend not to view their own lack of knowledge as a barrier to immunisation coverage. The nurses held a similar view to the doctors previously surveyed [14] regarding the statement that ‘lack of knowledge in health professionals was a barrier to immunisation’. Most participants (138; 92%) disagreed with this statement with 98 (65%) totally disagreeing. This idea was more likely to be held by younger nurses, under 40 years ($\chi^2 = 5.56$, $p = 0.0184$).

3.7. Response to adverse reactions

The nurses were also asked under what conditions they thought would warrant notification to CARM, NZ’s passive reporting system. Twenty percent ($n = 30$) indicated that they would notify even mild local reactions (for example, ‘*Every reaction however small.*’) although the Immunisation Handbook advises that only unexpected or serious adverse events following immunisation should be reported [16]. However, very few (18; 12%) had ever experienced a serious reaction. Of these events, four were anaphylaxis; seven were a child ‘*going floppy*’ (probable hypotonic hypo-responsive episode), one was post-vaccine encephalitis and three were cases of inconsolable crying. One reported fainting in an 11-year old as a ‘*serious adverse reaction*’.

4. Discussion

This is the first comprehensive survey of NZ family practice nurses on their views on barriers to immunisation, their knowledge and their reported responses to adverse events. These nurses are the primary vaccinators of children in New Zealand.

The views of practice nurses is in accordance with studies of family physicians and of parents themselves, showing that parental concerns over vaccination safety is the most significant barrier to immunisation. The nurses strongly identified a need for resources to help address misinformation that is often accessed by parents, to provide balanced information about the risks and benefits of immunisation to assist parents’ confidence in their decision to vaccinate their children.

Many of the nurses themselves demonstrated lack of knowledge with respect to the safety of vaccines, with a significant minority incorrectly identifying presented conditions as contra-indications. International literature shows that poor knowledge of immunisation by health professionals, rather than attitudes, is the single biggest factor in vaccine uptake [4,6,17,18]. This was borne out by the findings that the more recently trained nurses and those with the best practice coverage rates were more likely to give correct response to the questions on contra-indications to vaccination. Only 27–29% indicated they would like more knowledge about the vaccines and their side-effects but clearly their responses indicate an overly cautious approach in which opportunities to vaccinate will be missed.

The nurses’ confidence in their own knowledge of immunisation was neither an indicator of their actual knowledge nor practice coverage rate, and a significant proportion of those with poor knowledge were confident.

Over 20% of participants believed that 6 weeks could be too young to immunise babies. As small babies are most vulnerable to the serious sequelae of disease, in particular pertussis, this is concerning.

There was little significance between recent completion of a vaccinator-training course and a poor versus good knowledge of contraindications to vaccination. The reasons for this may be firstly that the survey was not an open book test, unlike the initial training course; secondly that the method of conveying vaccine contraindications in training may need to be reviewed, or thirdly, that training has little influence on knowledge of vaccine contraindications.

A number of nurses indicated that they would report minor vaccination reactions as adverse events to CARM. It was of interest to note that very few of these 150 practice nurses had ever reported experiencing an adverse reaction that concerned them in any of the children they had vaccinated.

A recent study of the knowledge and attitudes of NZ mothers around immunisation [10] found an underlying fear of vaccines and their perceived side-effects across socioeconomic groups, including both parents who do vaccinate their children as well as decliners to immunisation [19]. Despite these consistent findings, current NZ strategies to improve immunisation uptake predominantly focus on structural barriers to accessing services [20].

Current vaccinator training appears to have a significant impact on immunisation coverage rate in the practice. How-

ever, it is not significantly correlated with a better knowledge of contraindications to vaccination in cases of the poorest scores on knowledge. These findings support the importance of ongoing vaccinator training as an effective tool for improving coverage, and a greater focus in these courses on vaccine contraindications may further improve this. In NZ vaccinating practice nurses are required to complete an initial 2-day vaccinator training course with an open book examination. They are then required to complete update courses every 2 years, which are not examined. The results of this study will be incorporated into the national vaccinator training programme to ensure that deficiencies in knowledge relating to contraindications are addressed. Consideration will be given to testing knowledge on contraindications during the update courses.

As parental fears and low confidence appear to be the major concern in the NZ population, a trained practice nurse appears to play a significant role in overcoming fears and maintaining high coverage rates in their practice. Strategies that focus on primary health care provider support and education therefore are more likely to gain higher coverage than those that are purely directed at overcoming access barriers.

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